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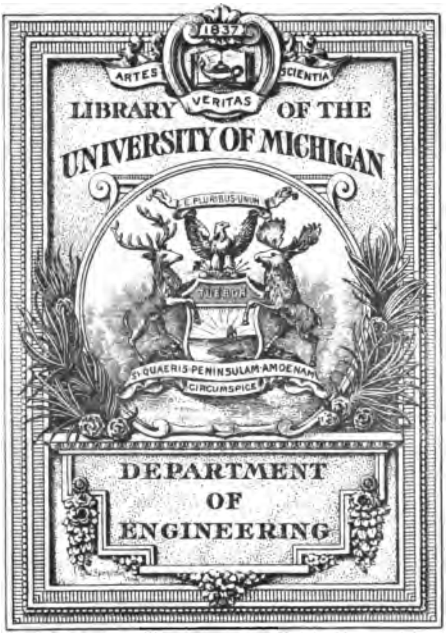

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PRACTICAL PLANER KINKS

FOR PLANER HANDS

BY CARROLL ASHLEY

New York
Hill Publishing Company
1905

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PREFACE.

To the reader of these pages I have no apology to make, except as to the use of the pronoun "I," which is a universal word with planer hands. I have no axe to grind for anyone. These pages are not intended to advertise any one make of planer, however much I should wish to do so; but this is written for the planer hand by a planer hand.

In has been hard to judge just what to say and what to omit in treating this subject, but I hope that both the apprentice and the journeyman may find something of practical value herein, and that the planer hand may be encouraged to better his condition.

Most of the illustrations have appeared in the AMERICAN MACHINIST, and are from competent workmen. I have added to these much that I have learned during seven years' apprenticeship on a planer of the first class.

C. A.

152991

THE METAL PLANER.

The planer, or surfacing machine, is probably the most abused machine in the machine shop, inasmuch as it is placed in the darkest part of the shop, generally in the center; yet not a few manufacturers pride themselves on their planer work, tho' the man behind the platen is kept in the dark about that. The first essential to good work is a good machine, the next is the workman. A good machine is one whose every part is in perfect alignment, from the "housings" to the "ways."

It is often found necessary to square up from the housings, and a planer builder who neglects to have his housings square with the platen could never sell me his machine—if I were on the market for one.

The next important point is the control of the platen; in these days of high speed, it is not to be expected that the platen will stop dead on the shifting of the lever, but the shifting lever should work easily, and should shut off the power, whether on the cutting stroke or on the reverse motion, the instant the lever is moved to the center;

therefore a machine that can be stopped only by throwing the countershaft shifter is worthless as a profit producer.

If the planer you are running is not arranged to be stopped by shifting the lever to the center, by all means call your foreman's attention to it, because it means the saving of the job sometimes, to say nothing of saving yourself from being maimed for life, if you should get your blouse caught and could not reach the countershaft shifter.

Planers as a rule are not supplied with even the required tools and fixtures for getting out the work. The man who operates it is partly, if not wholly, responsible for this state of affairs.

In my own case, I found time during long cuts to change this condition, although I have been severely censured for so doing by a few—and I am glad to say only a few—fellow workmen, some of whom the "old man" saw fit to "let go" because that was all they did, criticize.

The result was that I turned out better work and more of it and was raised from time to time, until I got wages at par with the best workmen in the shop.

In Fig. 1 we have a picture of a

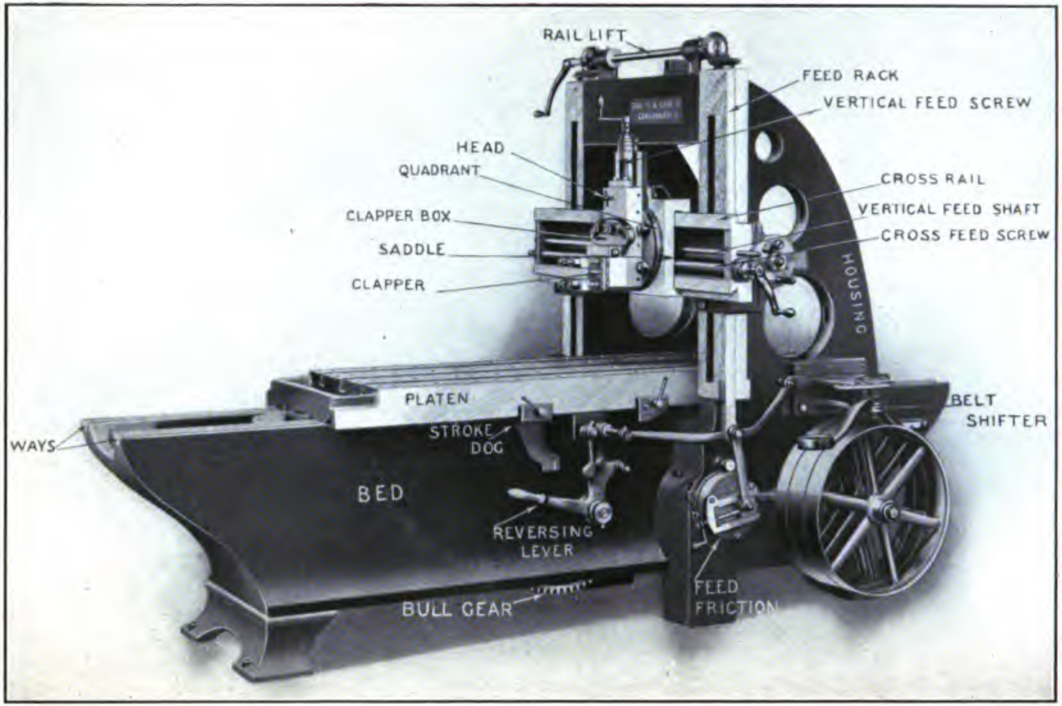


FIG. I. A MODERN PLANER WITH THE PRINCIPAL PARTS MARKED.

modern planer, with the names of the principal parts attached thereto. It is proper, I think, to know the names of the parts of the machine you are identified with, so as to be able to discuss its integral parts intelligently.

Where a planer has only one head, it is sometimes called a cross-head, and where only two, the one on the back side is spoken of as the second head. Where more than two heads are attached, the heads on the housings are called extra heads, but don't be guilty of calling the platen a "bench," as I heard a good man once speak of it.

The size of a planer is written thus: 30 inches by 30 inches by 8 feet, which means that a planer that size will plane work that is thirty inches wide by thirty inches high and eight feet long. While many shops are equipped with a full complement of planers, some having as many as thirty and forty machines, the majority have only one or two planers, and oftentimes it becomes necessary to rig up to do certain jobs beyond the capacity of the machine. In some such case I hope this book may be useful as reference. Sometimes a picture of a job, chucked and machined in a certain manner, gives the workman the right idea for his own job.

However old a thing may be,
And rusty with old time's mildew;
Genius its shortcomings sees,
Remakes the old to something new.

THE PLANER HAND OR OPERATOR.

It is too often said "that the man who runs a planer has a snap." Perhaps this is true in some shops, viewed from the standpoint of the casual looker-on. In some shops, and on some planers and some classes of work, it is true. In a tool-room, for instance, where time is no object and a finish cut of two notches on cast iron, it awakens no criticism, but in a job shop it's different. A man has to take from three-quarters of an inch to sixteen inches finish cut, and the foreman seems to think it is little enough sometimes.

However, a good hand is judged now-a-days, not by his chips (as of yore), but by the number and quality of finished pieces he turns out in a certain time, and it is up to the workman to improve his equipment. In speeding up on your work, don't lose sight of the quality of the same, for you may turn out a large quantity and the quality suffers for want of accuracy. Always be particular in your measurements. You may be laughed at for using a microscope for reading your distances on the work, but don't worry, you get the first whack at the castings, and a *fit* is a fit, and a loose fit is worse than a tight fit, because of the lack of "putting-on-tools." Need I say more?

Act on the square toward your fellows. Get your work square and you can expect square treatment from others. It has been said that "a sixty-fourth is close enough for a planer." Don't believe it. Take cigarette papers and put one behind the blade of a square near the top and another behind the blade near the beam of the square, press the square gently against the work, then pull carefully on both papers, one at a time. The paper that fits the loosest or tightest shows you which way the work is out. If you make a "bull" that you cannot rectify, tell the boss, also tell him how he can remedy it by a change in construction. He may not adopt it, but it will be on the square for all concerned.

Every move counts, whether chucking up or starting or stopping the platen. It is important then to systematize yourself. Get your fixtures where you can make them ready for business in the shortest possible time. Do not forget to grind your tools often.

Keep the bearings well oiled and the belts just right.

I used to oil up every hole every morning except the "ways" and the "bull gear" (the large gear that drives the platen), and every Monday and Thursday replenish the oil in the oil recesses under the platen, and often brush the ways with clean oil. Every Saturday night I wiped off all the planed parts of the planer clean, then with a brush and a pot of oil I painted them all over with clean oil. This was not disturbed until the next Saturday night, when the same process was repeated. I never kept continually wiping the spotted work, and I always had a well *preserved planer*.

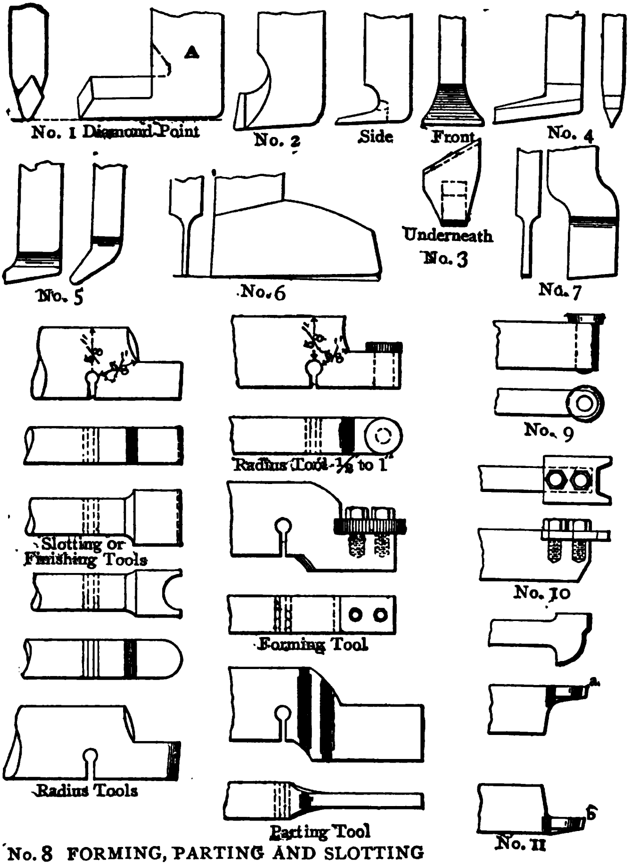
Lastly, please let me add, always do your work quickly and a little bit better than the other fellow, but don't tell anyone about it. The "old man" is paid to find out these things for himself. If he doesn't, when you go after a raise he will look up your record. There are exceptional cases to this, however, and your "old man" may be it.

EQUIPMENT.

Tools.—There is no given rule for the number or condition of tools with which a planer should be equipped, but there are certain tools that are better adapted to certain kinds of work than others. I will not tell you the different kinds of steel to use in their construction, because different shops have their own ideas as to what kind of steel shall be used in that shop. Although you and I can sometimes suggest a change of steel, we cannot always hope to be successful in this.

However, I can tell the shape and design of some tools which I have proved by experience to be adapted to some work.

There is another subject I will not touch upon, and that is the sharpening of tools, because it is a lamentable fact that no two men grind their tools alike, and the conditions to be found in my shop are altogether different in yours; that is, you may be planing work of a certain class the year round, while I may have from five to ten different jobs in one day, and all different material. There is, too, a change in the quality of the steel and cast iron to be machined in the different shops, so we all must necessarily sharpen our tools to meet those conditions and let it go at that.



No. 8 FORMING, PARTING AND SLOTTING TOOLS AND TOOL-HOLDERS.

FIG. 2. PLANER TOOLS.

No. 1 in Fig. 2 is the standard diamond point. The too common way these tools are forged is to relieve the tool like the dotted line at *A*. If this is omitted and the bottoms ground on a large radius, you have a most satisfactory tool for either steel or iron. A feed of from one-sixteenth of an inch to three-eighths of an inch, and as deep as the cutting edge of the tool, is nothing for this design of a diamond point to do. Five or six diamond points are none too many to keep on hand, so as to have them ground at a different rake for steel or iron.

No. 2 is for cast iron. I call it a "hog-nose," because it will rip off all the planer will pull. No. 3 is a finisher for cast iron. It will not chatter, and must be firmly held in the tool-post. It should be used only in clapper boxes having tie-bolts, as it has a tendency to cant. No. 4 is a finisher for the sides, for vertical or angular cuts. In grinding finishing tools always break the corners. If you don't, the corner that does the cutting gets dull first, and leaves deep scratches in the work. This tool just described works nicely on any metal. No. 5 is a roughing tool for the sides, and is also for vertical and angular surfaces. It is sometimes offset at both ends, thus making a saving in the number of tools. No. 6 is a very strong

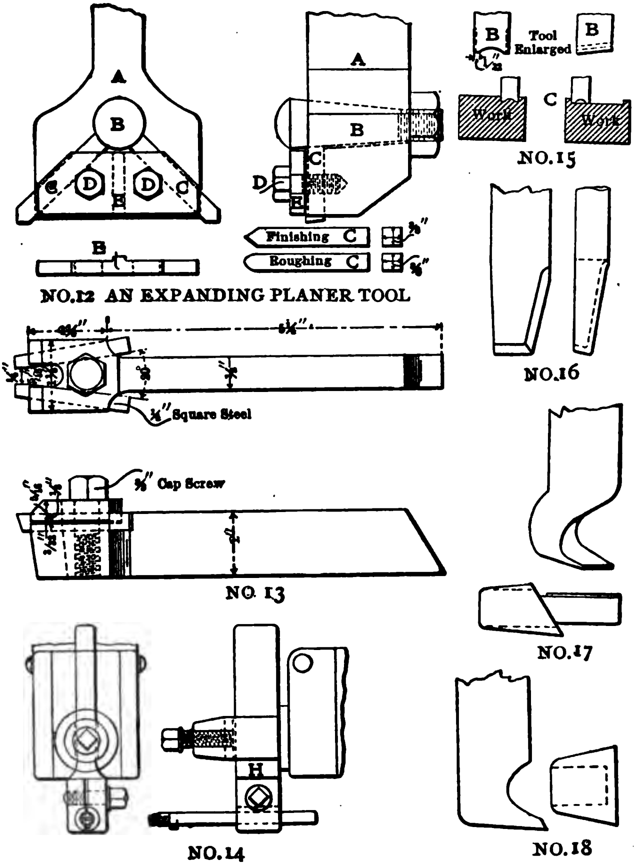
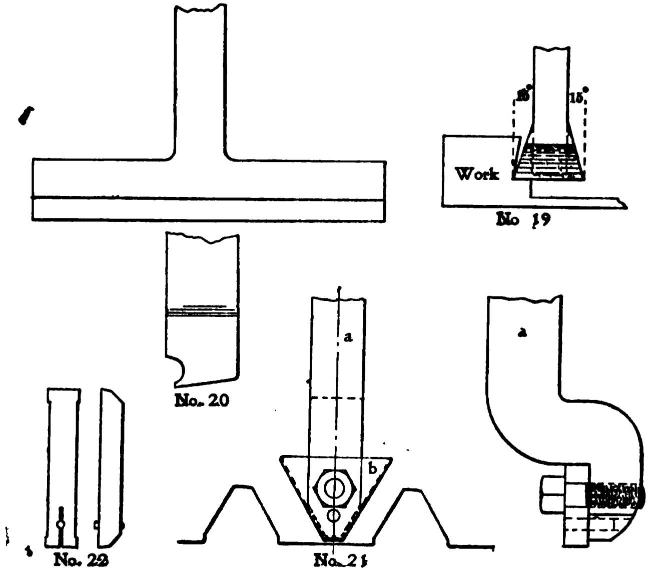


FIG. 3. PLANER TOOLS.

parting tool. The temper is drawn to within about ⅜ inch of the cutting point. This tool was designed for cutting a large number of slots in cast iron, and will last for a long time. No. 7 is another form of parting tool called the goose-neck. Tools are made in the goose-neck shape to prevent chattering. No. 8 shows methods of relieving this style tool. No. 9 is the best radius tool to have for small circle work under 1 inch. Nos. 10 Fig. 2, 12–13 Fig. 3, 21 Fig. 4 show tool holders with inserted tools. They are



PLANER TOOL FOR V-WAYS

FIG. 4. PLANER TOOLS.

exceedingly handy, especially for irregular forming work. In No. 12, the shank *A* is machine steel; *DD* are machine steel cap-screws case-hardened; *E* and *B* are tool steel; *B* is tool steel tempered. No. 11, Fig. 2, is a cheap way to make forming tools. The stock is cut away, leaving a web of generally ⅜ inch to file or grind to shape. No. 14, Fig. 3, is a splining or slotting tool for cutting slots for keys in hubs of pulleys or similar work. In No. 15, Fig. 3, is seen a tool for making an opening in cast iron or brass. The round-nosed tool is used so extensively on all classes of work that I have not sketched it. In cutting brass with it, it is well to rub an oilstone directly on the cutting edge. This is sometimes called dubbing it. No. 16, Fig. 3, is a roughing tool for machine steel. What the "hog-nose" is to cast iron this tool is to machine steel; by grinding it rounding, it answers for a finished tool. No. 17, Fig. 3, is a finishing tool for cast iron only. Some planer hands prefer this tool to any other, but while it does very good work, in finishing any ordinary surface on cast iron, I prefer a design of tool similar to No. 18, Fig. 3, for finishing accurate work. No. 19, Fig. 4, is similar to No. 18, Fig. 3, in construction, but the sides are machined or ground back to give a clearance of 15 degrees, so as to machine the large amount of 5 and 10 degree work, so plentiful in some shops, especially in die rooms. No. 20, Fig. 4, is another finishing tool for cast iron. The cutting edge is ground square with the shank, and the cutting edge is made from 1 inch to 16 inches wide. For a planer as large as 36 inches by 36 inches by 10 feet, 6 inches is wide enough; but large planers are generally stiffer machines, and are competent to pull greater cuts. A trial of this design of tool will demonstrate just what the efficiency of your machine is, and you can govern yourself accordingly. No. 21, Fig. 4, is for angular work, and the inserted cutter may be made to plane other angles than 45 degrees. No. 22, Fig. 4, is for cutting standard size slots. It is a double ender. The upper or solid end is for roughing out, and the other end for finishing to size. A taper pin makes the finishing end adjustable.

There are also gang tool-holders, made especially for planer work, but they are a rarity in most shops. They are very rapid for light work, where the stock to be removed is nominal, but for good all round roughing on cast iron I prefer my hog-nose, No. 2, Fig. 1. You can't have too many tools.

I myself had over three hundred pounds of tools, most of them radius tools for different circles, yet I never thought I had too many.

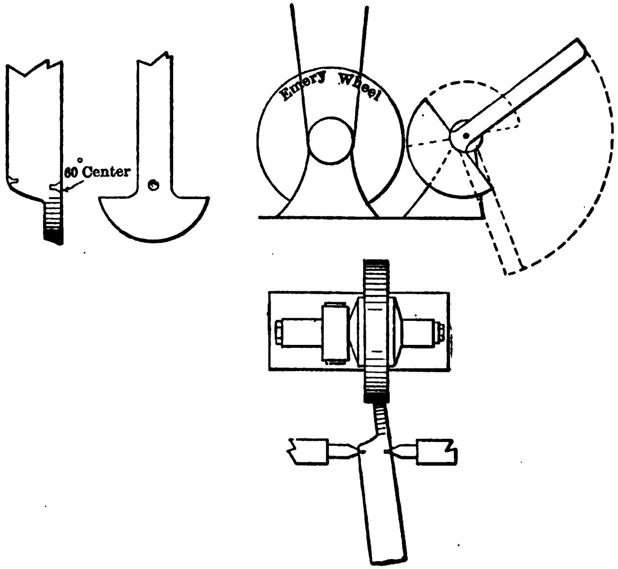


FIG. 5. METHOD OF GRINDING RADIUS TOOLS.

Fig. 5 shows an accurate method of grinding radius tools. The drawing is so plain that a description is unnecessary.

Fixtures.—The first fixture I made for my planer was an arrangement to take the place of the planer chuck.

It consisted of three parallel strips, planed with a key on the bottom to fit in the T-slots, and of different lengths. One was 2 feet long, 4 inches wide, and 1 inch high. One was 3 feet long, 4 inches wide and 2½ inches high. Another was 4 feet by 4 inches and 3 inches high.

These strips are held in the T-slots by means of three ⅝-inch anchor bolts. They were inserted in the farthest T-slot from the working side of the planer.

Fig. 6 shows the design of the dogs I made to screw the work against these strips. (It is understood of course that only one strip was used on the planer at one time). With this fixture almost all work can be done that is usually done in a chuck; in fact, I never put on the chuck unless I have an extremely angular piece of work to plane.

It is well to have a goodly supply of planer stops, both plain and screw stops.

From ¼ inch to 4 inches high is about the limit, but get as many as you can. At Fig. 7, No. 1, are shown two styles of screw stops. They should be made from machine steel, with tool steel set-screws. The tapped holes should be full threads, and are much better if tapped and drilled at an angle of 10 degrees.

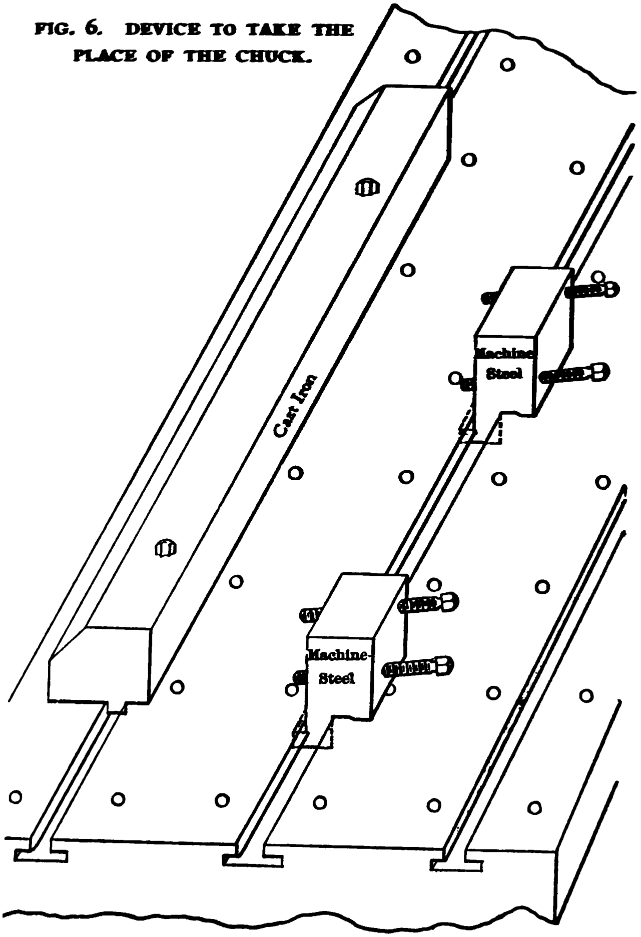
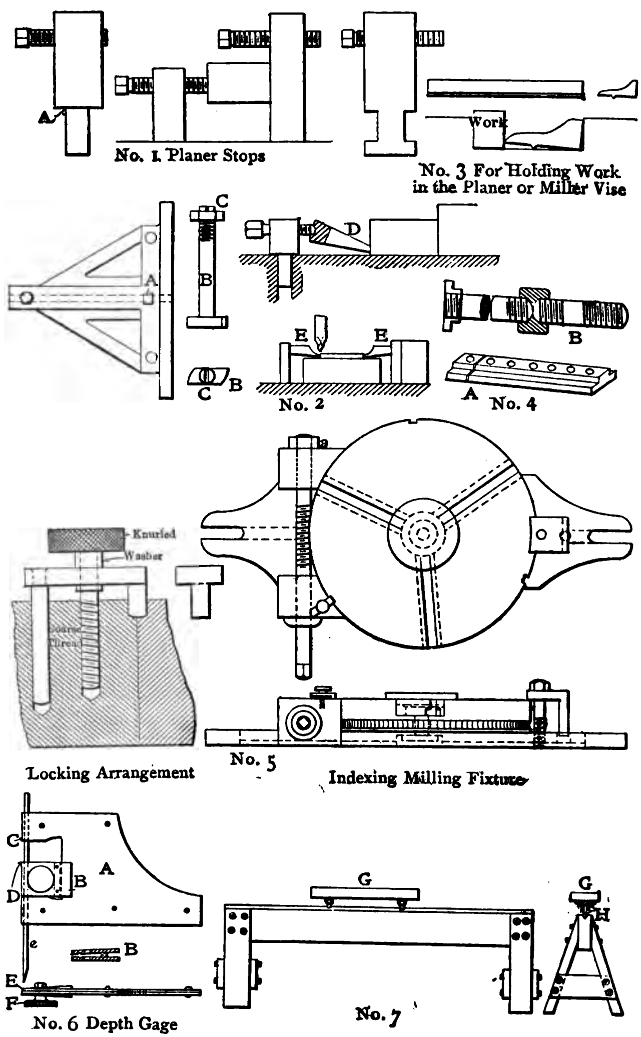


FIG. 6. DEVICE TO TAKE THE PLACE OF THE CHUCK.



No. 1 Planer Stops

No. 3 For Holding Work in the Planer or Miller Vise

No. 2

No. 4

Locking Arrangement

No. 5

Indexing Milling Fixture

No. 6 Depth Gage

No. 7

FIG. 7. PLANER FIXTURES, PLANER STOPS AND DEPTH GAGE FOR PLANER.

The sizes should be from ⅛ inch to 3 inches, unless you are working on a very large planer. In that case 5 inches is as high as it is practicable to go.

If you have a sufficient supply of screw-tops there is no necessity of using wedges.

Wedges are relics of the past.

No. 2, Fig. 7, shows an angle iron at *A* that is splined for a key on the bottom, and is very handy for squaring up, and may be used as a square stop for holding a number of pieces when one is chucked at one time. *B* is an insertable bolt, slotted at *C*. By placing the head in the slot and giving it a half turn with a screwdriver, it is ready for business. *D* and *EE* are hold-down strips. No. 3, Fig. 7, is another hold-down strip that may be used to advantage on some work. No. 4, Fig. 7, is the way to make your anchor bolts and heads. A piece of machine steel as long as the number of heads you wish to make is planed like *A*. Holes are then drilled and tapped to receive the size screw you wish to use, after which it is cut off, filed up and case-hardened, using soft-threaded studs and case-hardened nuts. This style of anchor bolt lasts a long time, and your T-slots are always in good condition.

At *B* is shown how two may be joined together for a longer bolt. I had studs varying in size from 1½ inches long to 24 inches long by ½ inch difference in length.

No. 5, Fig. 7, is a special chuck with index attachment for cutting slots in clutch collars.

At No. 6, Fig. 7, we have a depth gage of my own design for the planer hand's use. Its principal function is to show you how deep you are planing, and at the same time keep the gage square with the work. It is made of sheet metal and riveted together. The piece *B* is clamped to the needle by thumb-screw *F*, and has a movement from *C* to *D*. The needle is a slip fit in hole *E*.

No. 7, Fig. 7, is a cheap planer extension. The traveler *G* runs on grooved wheels on square piece of cold-rolled steel at *H*. It is useful for holding pieces wider than the capacity of a planer.

The work may rest on the traveler *G* without being tied down with bolts.

Fig. 8 shows a section of a planer platen. It is customary for some planer hands to take a sharp-pointed tool and plane fine lines crosswise and lengthwise of the platen. These lines are about 1-32 inch deep. The cross-lines are made by hand; that is, the tool is turned half way round, and the platen pulled by hand until the point of the tool is just back of the stop-holes, then the head is fed rapidly across. These lines are placed there to act as guides for laying the work square on the platen. The objectional feature to this practice is that the marks get filled with chips. For that reason the author has never marked a planer platen in this manner, but many good planer hands mark the platen thus.

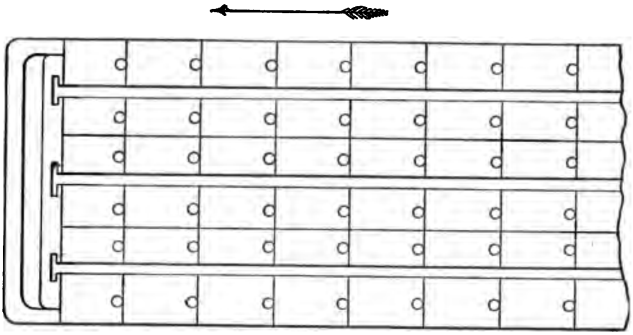


FIG. 8. MARKING THE PLANER PLATEN.

Clamps.—In No. 1, Fig. 9, is shown the universal planer clamp. This clamp, as all planer clamps should be, is made of tool steel. It is a good plan to have several sizes of this style of clamp to accommodate all kinds of work.

No. 2 is the goose-neck clamp. It is used in anchoring awkward jobs on the platen. This clamp is made heavier than No. 1, because it is generally used on work that does not require a tit clamp.

No. 3 is a straight clamp beveled at each end. Two bolt holes are drilled near each end, with a large hole twice the diameter of the aforesaid bolt holes. It is used often as a knee clamp, which will be shown in another illustration.

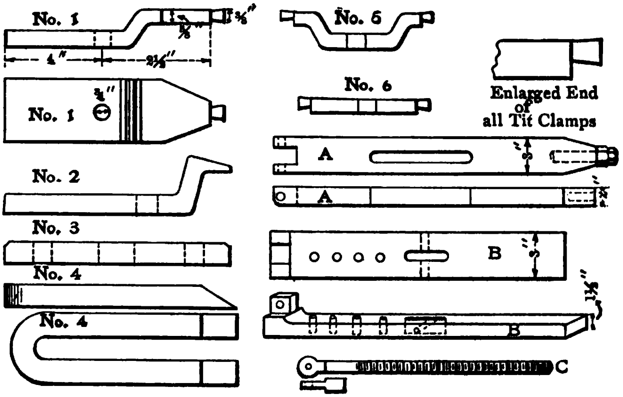


FIG. 9. PLANER STOPS AND PARTS FOR AN ADJUSTABLE PLANER STOP.

No. 4 is a U clamp. This style of clamp is made in different lengths. Its advantage over other clamps is that the anchor bolts can be slipped in the opening in any position to suit the requirements of the work.

In Nos. 5 and 6 we have double-end tit clamps. These clamps are used principally on gang work where a number of pieces are chucked at one setting on the platen.

A, *B* and *C*, Fig. 9, are parts of an adjustable planer stop. Oftentimes it is necessary to stop work on the platen with braces and other devices, because of the height and awkward shape of the work. I designed this adjustable clamp for just such emergencies.

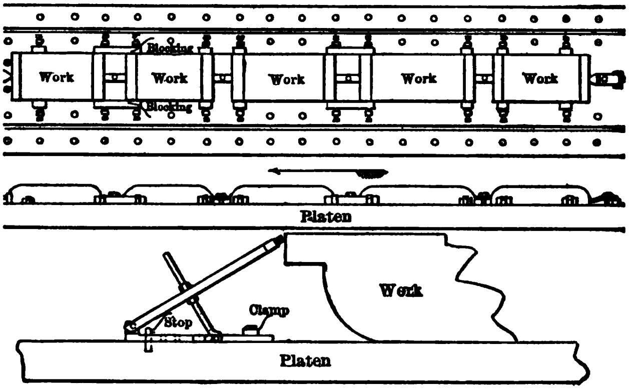


FIG. 10. AN EXAMPLE OF GANG WORK AND ADJUSTABLE PLANER STOP.

In Fig. 10 is shown how it is used. Two of these adjustable stops will add much to your equipment.

In Fig. 10 an example is shown how several pieces are held at once. It will be noticed that only two plain stops are used to stop the work from the thrust of the tool. The screw-stops on the sides effectually prevent any side motion. The clamps between the different pieces of work act as stops to each individual piece.

LINING UP THE "RAIL."

No matter what care is taken, the "rail" will get out of alignment.

There are various reasons for this:

Sometimes it is the character of the work, and again it may result from carelessness on the part of the workman when raising or lowering the "rail," or a loose setscrew holding the bevel gears to the lifting screws.

For instance: The operator is planing work that does not require the changing of the position of the "rail," and in letting it down to its place, he does not "take up the slack." Perhaps one side sticks and remains so, and he has not tightened the retaining bolts to the "housings." The thrust of the tool against the work then will strain the threads on whichever side the head is used the most, and the result is that the "rail" is "out."

The platen is oftentimes planed true to remedy the defect, but the platen should only be trued up *when the platen itself is out.*

It often takes considerable time and care to line up the "rail," but true planing requires a true "rail" and platen, hence it is time well spent if done right.

The old way to line up the "rail" was with a surface gage and pieces of paper thrust under the needle to "feel" when the needle touched the the top bearing for the "saddle."

The best way is:

First. Run the platen so that the tool-box is about central from each end of the platen.

Second. Lower the "rail" to convenient height from platen; raise it again and take out probable back-lash.

Third. If a single-head planer, run head to center of planer, from side to side; if double-head, run second head to its maximum travel from you to the far end of the "rail." Run first head so that the clapper box is about even with the edge of the platen nearest to you. (You are supposed to be standing on the working side of the planer).

Fourth. Tighten retaining bolts fast to the "housings."

Fifth. Insert any old tool bottom upward in clapper box (Fig. 11); if double head, in the head nearest to the working side. Clamp a micrometer with the thimble end down to the aforesaid tool.

Sixth. Run head until the micrometer

is about one inch from edge of platen, then screw the head from you until back-lash is all out, gently turn the micrometer thimble until it just touches the platen (a good parallel can be used for contact if platen is too uneven), take a reading and chalk it down;

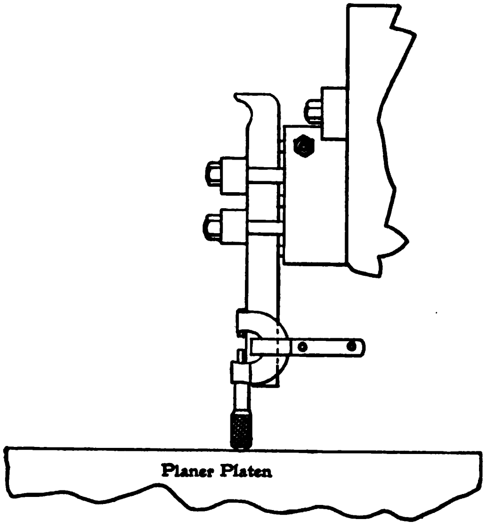


FIG. II. LINING UP THE RAIL.

now run this head to the far edge of the platen, taking care to have the "thrust" of the lead screw operating that head the same direction as when you took the first reading. Then take your second reading from the "mike." Compare the two readings, and the difference shows how much the "rail" is out, and which side wants to be adjusted.

Seventh. On the side which you wish to change, turn the bevel gear at the top of that housing backward from the way it was turned when the rail was lifted; now loosen the set-screw and shift the gear around the way you have figured it should go to change the position of this lifting screw; just a slight turn the first time till you are sure you are right, then tighten the aforesaid set-screw; now loosen the retaining bolts that clamp the "rail" to the housings; lower and raise the "rail" about an inch, taking care to raise your "mike" out of danger. Then return the head to its first position, tighten your "rail" to housings and take readings from the micrometer as you did before. This is sometimes a tedious job, but it is the only accurate method of aligning the "rail" for close planer work.

The author wishes to note here that if different jobs are chucked in a different location on the platen, instead of chucking every job in the center of the platen, it will even up the wear and tear of the platen's surface and the bearings of the saddle and "rail."

CAUTIONS.

First. If you have not already done so, turn the screw on your head or heads, as the case may be, until you have let the heads down as far as they will go. With a wide-nose sharp chisel mark a "limit line" opposite the top of the slide on the saddle. This line will warn you just how far to feed down before breaking teeth out of the feed rack, and you can also measure from that identical line for distances for feeding different lengths.

Second. When working two heads on a horizonal cut, never let the saddles be closer together than ¼ inch, and always throw the feed in for the head farthest from you first if you are cutting that way, and if you are cutting towards you, *vice versa.*

Third. Always keep the "rail" just high enough to clear your work and bolt heads.

When lowering the "rail," always lower it lower than you want it, then raise it to the desired height.

If there is any back-lash in your lift, or one side is tighter than the other, this mode of procedure will bring the "rail" to its alignment, where if you simply lower it to required height, and one side should stick, your work will suffer in consequence. This is a very essential point to remember.

A man once hired out in a shop as a first-class planer hand, and the first job he had was a bolster plate 3 inches high. The rail was about 20 inches high from the platen. After chucking his work, he screwed the head down to its limit (about 7 inches below the rail), then hunted up a long facing tool and inserted that—for a roughing cut mind you—and "let her went." She went with many a groan, grunt and chatter, and the "old man" soon came up, and the foreman was asked to tell the man to "hit the grit."

Fourth. Keep the collars on the lead screws in your "rail" adjusted, for if one is too loose one head will jam the other, because one will stop feeding in the midst of a cut, and you may not notice it. An inspection of the collars at least once a week may save a wreck.

Fifth. Don't plane off your platen too often.

There is no given rule for this, as it depends altogether on the class of work you are on. With proper care, I have seen the platen planed but once in three years, but the exception will be, of course, when very heavy or rough work is turned out. A good plan is to have two pieces of 3-inch leather belting about 3 feet long. Rest your rough work on these, and after sliding it to its proper position, with a pinch-bar, the work may be easily raised a little and the belts withdrawn. This is the best way to care for your platen that I know of.

FIRST LESSONS IN CHUCKING.

"A piece well chucked is half planed." One principal reason that a planer hand is not always a successful workman is because of his inability to read drawings correctly.

The author suggests that a planer hand get all the knowledge he can of foundry work. He will find out that if he knows how pieces are cast, it will greatly aid him in machining his work. The torsional strain of the metal is held in one position until the planing off of the scale lets those strains loose.

If the workman knows the character of these strains, which he will learn in the foundry, it will greatly aid him in clamping his work to the platen.

In Fig. 12 is shown the right and wrong way of using the clamps. It is not possible for me to tell you just how tight the clamps should be anchored, except in a general way they should be just a little tighter than is necessary to hold the work. This is a point to be learned by your own experience, and on your own class of work. In this same illustration are some odd-shaped pieces, which show how they should be stopped, and where to drill the anchor holes.

In clamping pieces of similar nature, it is well to remember to shim up if the casting does not rest perfectly flat, so that there will be a point of bearing between the platen and the casting at the outside edges and directly under the anchor holes.

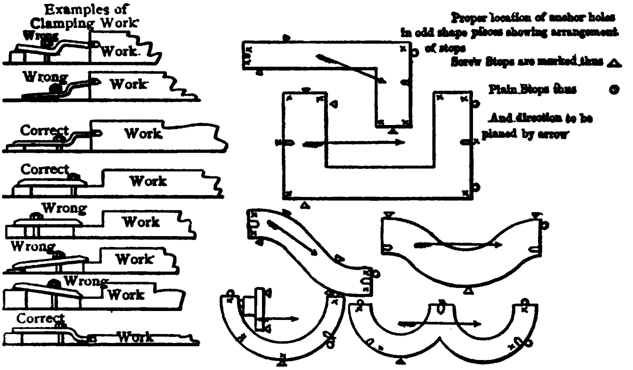

Examples of
Clamping Work
Wrong
Work
Wrong
Work
Correct
Work
Correct
Work
Wrong
Work
Wrong
Work
Wrong
Work
Correct
Work
Proper location of anchor holes in odd shape pieces showing arrangement of stops
Screw Stops are marked thus △
Plain Stops thus ⊙
And direction to be planed by arrow

FIG. 12. EXAMPLES OF CLAMPING AND ODD SHAPED WORK.

At the points marked *X* in Fig. 12 are shown in a general way the location of the points of bearing. If the casting does not rest at these points of bearing, pieces of tin or sheet metal should be used for shimming.

In Fig. 13 we see a planer piece chucked ready for planing. Supposing this piece rested at points 2 and 4, it would consequently rock on those points, so that points 1 and 3 would rattle. The shimming up would be under points 1 and 3 and 5 and 6. If the piece is over 1 foot long, and there is an opening under points 7 and 8, shims should be put under here.

If points 7 and 8 should rest, and there be an opening under all other points, if the piece is very long, the shims under the ends should be forced in a little tight.

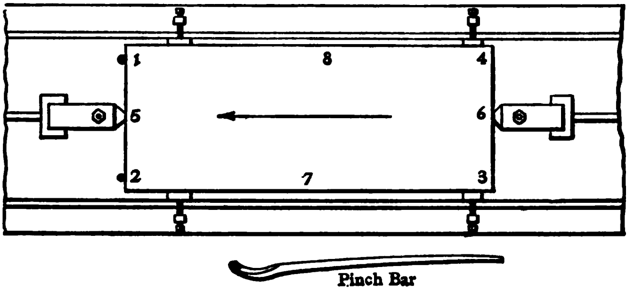


FIG. 13. PLAIN PIECE CHUCKED READY FOR PLANING.

Always shim under the outside corners first if they need it, and under the anchor holes last.

A triangular piece or a half round piece should have at least three points of bearing, besides shimming under the anchor holes.

A square or oblong piece should have at least four points of bearing, besides shimming under the anchor holes.

There is one tool that is very essential to planer work that I have not sketched, and that is the pinch bar, or the planer hand's jimmy. This is shown in Fig. 13. It should be made of tool steel about 2½ feet long, ¾ inch round stock.

The knee clamps, before illustrated, are shown in position in Fig. 14. They are seldom used, except in cases where it is not policy to drill anchor holes.

(The arrow in these illustrations designates the direction in which the work is to be planed).

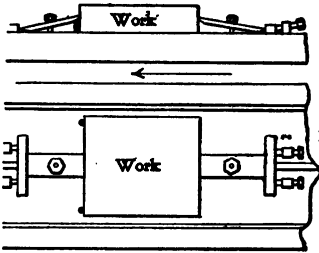


FIG. 14. KNEE CLAMPS.

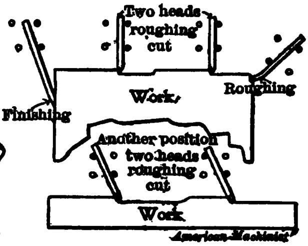


FIG. 15. CLAMPING THE TOOL.

Fig. 15 illustrates how the tool should be clamped to give the best results. The dark spots represent the bolts on the clapper box, to be tightened first. By tightening the bolts nearest the tool first, a tool can be clamped with much less labor, and held more securely than if it were placed in the center of the clapper box.

Always keep the ends of the straps on the clapper box equi-distant from the clapper box itself, as if one side or the other is canted too much, you will soon have to have new bolts for your clapper box.

A glance at Fig. 16 illustrates how to square off the ends. In clamping work of this sort, the clamp *A* should be tightened down first, and before the screw stops *DD* are inserted, or the clamp *C*, the square can be put at *B* with the beam against the platen and the blade against the work; then by adjusting screw-stops *EE*, the work is easily squared up. The clamp *C* is then put on and tightened down, the stops *DD* are then screwed tight, after which the screw-stops *FF* are tightened, and the work is ready to machine.

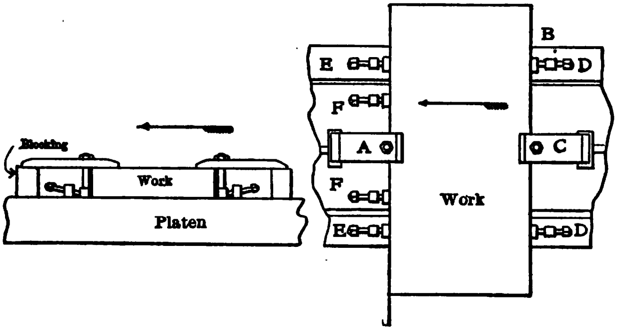


FIG. 16. PLANING OFF THE ENDS.

Sometimes in planing the sides (not the ends), the work has to be raised on parallels, so that the tool may clear the platen. It is important that the clamps should bind the work squarely on the parallels, as the work can easily be sprung by tilting the clamps.

In planing flat work in cast iron, it has been customary to rough off top and bottom, then turn the work over and finish the first side roughed, afterward again turning over and finishing the other side, and the author has seen planer hands turn it over still once more for another finish cut. There is a lot of valuable time lost in this manner. A cast-iron piece of work properly anchored to the planer can be roughed off, first on the top, then turned over, roughed and finished "at one setting," after which it is turned over and finished on the other side. I cannot emphasize too emphatically "that a piece well chucked is half planed."

Your success as a planer hand depends upon this.

PLANING CORED WORK.

Cast-iron work that is cored out, or has openings or abrasions that are not to be or cannot be planed, do not have to be turned over to be finished. The reason for this is that the scale keeps the work from changing.

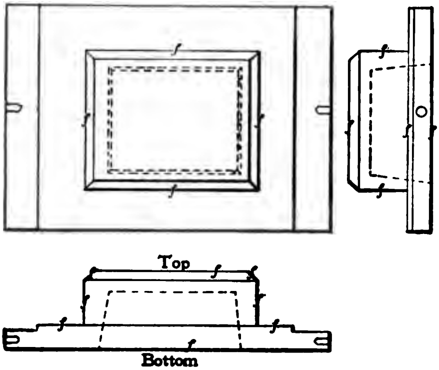


FIG. 17. CORED WORK.

A careful study of Fig. 17 shows a good example of cored work. This piece is chucked and its bottom roughed and finished at one setting, after which it is turned over and finished all around the top and sides without again touching the bottom.

Work of this character is chucked on wooden blocks, one block at each corner and one under each anchor hole. (This is for the first position in planing the bottom). Of course it is understood that the work is set in alignment by shimming up under the corners. A set of wooden blocks 2 inches square, and varying in height from ½ inch to any height needed, are valuable accessories to any planer hand's equipment.

PLANING ALL OVER.

Where a piece of work is to be finished all over, the top and bottom are roughed and finished, then the sides and ends are finished afterward. Once in a while a casting is found that will "change," in spite of all the care that can be taken, but such pieces can generally be seen to be imperfect before starting on them, and an allowance made accordingly. That is where a knowledge of foundry practice comes in to perfection. Sand holes and extremely uneven surfaces are the primary causes of the changing of work, and a man who knows how to clamp his work correctly is the man who is successful.

Cold-rolled key stock is a source of a good deal of trouble in planing all over. To plane this stock it is necessary to clamp this work securely in the vise, or against the "rail," that the author has before mentioned, and reduce the stock just half of what is to be taken off; then when it is turned over, it is clamped as before and pounded down flat, and the balance of the stock is removed. By taking care to take the same amount of stock off each side, the work will be "straight."

In planing tool steel, the work is not liable to change if properly chucked, but on work that is to be tempered the amount of stock removed on each side should be equal, or the piece will surely change in hardening.

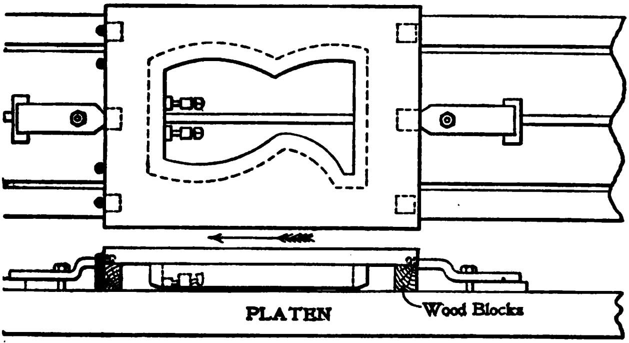


FIG. 18. PLANING BLANKING DIES.

On iron it sometimes takes three cuts to bring the work level. On composite dies (where the base is iron and the upper is a ring or strip of tool steel welded to the iron), the practice is to run a roughing cut over the top and bottom, after which the die is machined to the template. After the die is tempered, it is again returned to the planer to be finished on the bottom. This is done in two cuts.

A reference to Fig. 18 shows a die chucked for planing the bottom. Some work is somewhat wider than the platen, and where this is the case, the roughing cut should be of such a depth that it will not tip the platen when the other side is reached.

When planing with odd-shaped forming tools, especially radius tools of large design, it is better to cut the work "dry," because the tool will chatter if a lubricant is used.

MISCELLANEOUS.

Fig. 19 shows a pair of "tool lifters," which are very useful. *A* is a lifter to use when planing T-slots, but if you have your planer rigged up with a rope lifter like *B*, this device is superfluous. If a loop is made in the rope where it runs around the tool-post, you can take up the slack, and thus have your tool lift as high as desired.

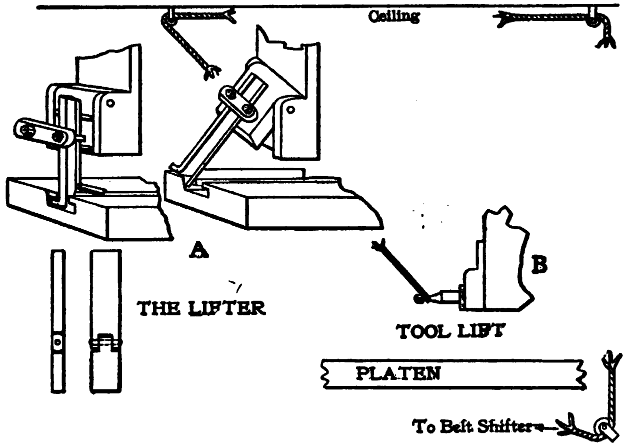


FIG. 19. TOOL LIFTERS.

TEMPORARY GRADUATIONS FOR THE PLANER HEAD.

Most planers now-a-days have graduated thimbles attached to their respective lead screws. By smearing vaseline or shellac on a flexible scale, or even a semi-flexible, it may be stuck securely on to the side of a planer head, and by scribing a starting line on the stationary part, readings can be taken as fine as your scale is graduated. At *A* in

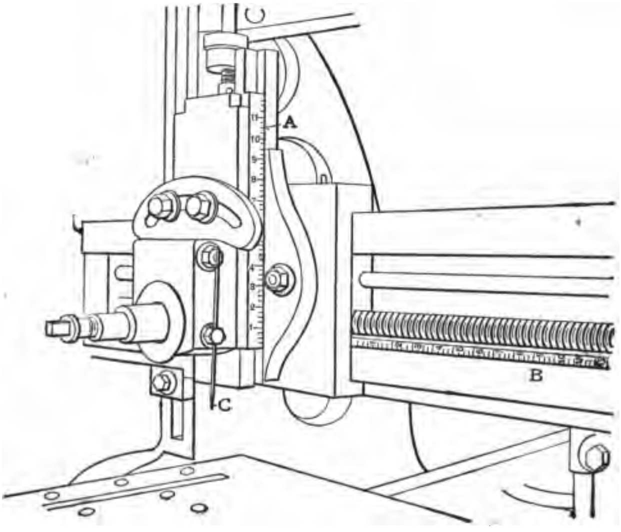


FIG. 20. TEMPORARY GRADUATIONS FOR THE PLANER.

the illustration, Fig. 20, I have a heavy scale, and at *B*, directly under the lead screw of the "rail," is a 24-inch. This scale is stationary, and readings are taken where the edge of the saddle and the graduations intersect. *C* is something different; it is simply a cap-screw with a hole in it, in which is thrust a pointed piece of round ⅛-inch steel needle. Some of the work comes to the planer with lines to work to; so, by using this attachment, the operator need not remove the tool from the post, as it often happens that a forming tool is in, and the trouble to remove the tool and insert the scriber is often considerable.

GRINDING ON THE PLANER.

The author does not advocate grinding on a planer in any degree whatever, but, as he has said before that some shops are only equipped with one planer, this machine must be rigged up to do other work than planing. Fig. 21 illustrates how to arrange the countershaft and belting for this work. This identical job was to grind out a die that had shrunk in hardening, and it was ground, as shown, up to the corners, which were afterward stoned out. Surface grinding is also done on this same arrangement.

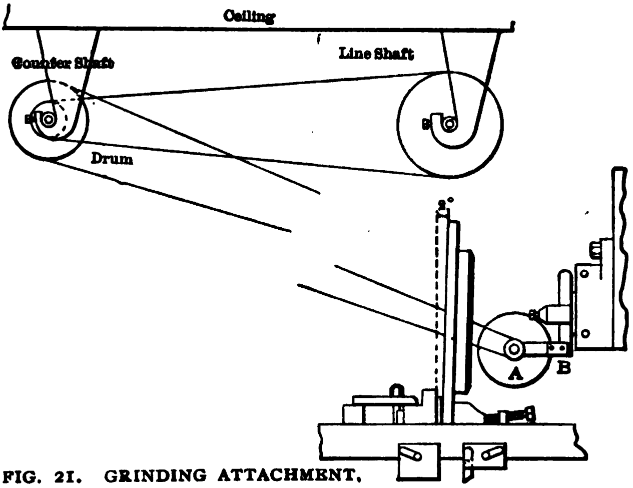


FIG. 21. GRINDING ATTACHMENT.

A CRANE FOR HANDLING A CHUCK.

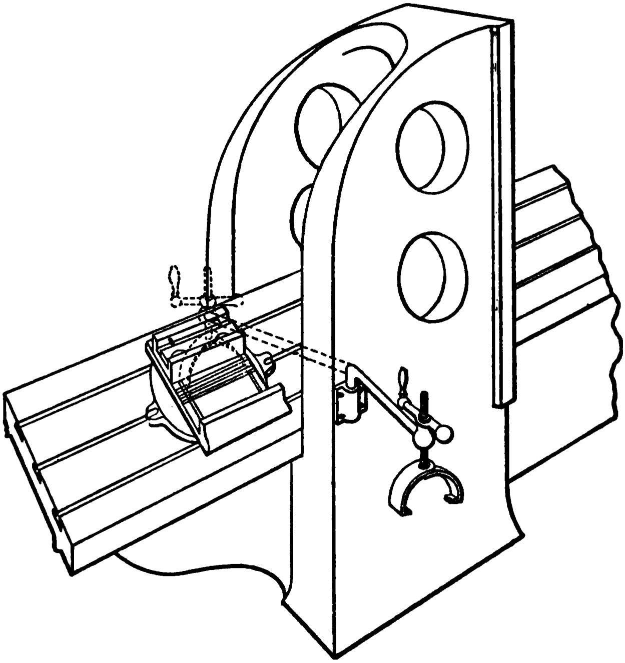


FIG. 22. CRANE FOR HANDLING PLANER CHUCK.

Fig. 22 describes itself. The lifting of the chuck to the platen is very hard on the back. This attachment is a great labor saver.

CIRCLE PLANING.

Various devices have been invented to plane circular work on the planer. I will not attempt to describe all of them, as there are a great many of them. In Fig. 23 is a design of my own. *AA* are square pieces of machine steel with stems turned and threaded.

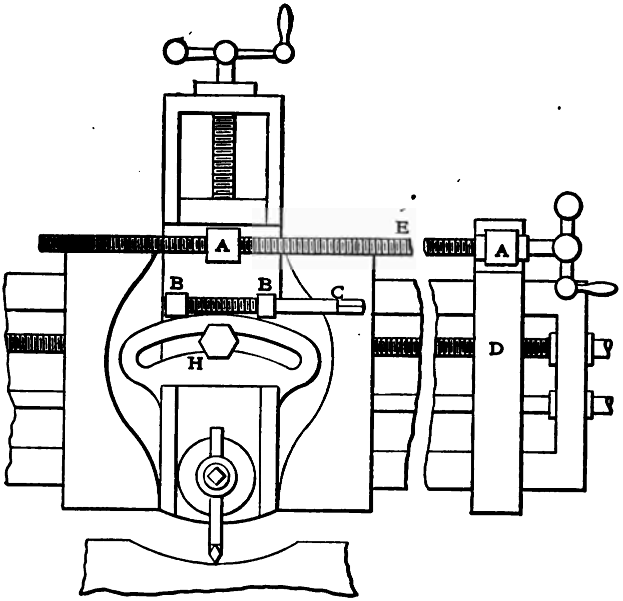


FIG. 23. ATTACHMENT FOR CIRCULAR PLANING.

One is screwed into the vertical sliding piece of the saddle, and the other into an adjustable clamp *D*. The one slide is threaded to receive lead screw *E*, and the other has a plain hole to receive the unthreaded part of *E*, with collars on each side.

AA are not screwed in tight, but swivel as required when the slide is moved by turning the screw. *BB* are studs similar to *A*, and bored to receive screw *C*. The top of the quadrant is "hobbed" on its circular part. In conjunction with screw *C* it acts as a worm gear.

Collars (omitted in the drawing) hold the screw in position to move the quadrant to the full extent of the slot *H*. The upper fixture is designed to machine large circles. The tie-bolts that hold the slide to the saddle are adjusted just tight enough to allow the slide to be moved. The lower fixture is for smaller circles, and the tie-bolts that hold the quadrant to the slide are slacked sufficiently to allow it to move. Both fixtures are detachable, and are handy in a tool-room or elsewhere. In practice the lower one is the handiest, as it allows the operator to move the slide up or down without interfering with the arc to be cut, while in operating the upper fixture the changing of the tool changes the radius.

In all cases tighten the saddle to the "rail."

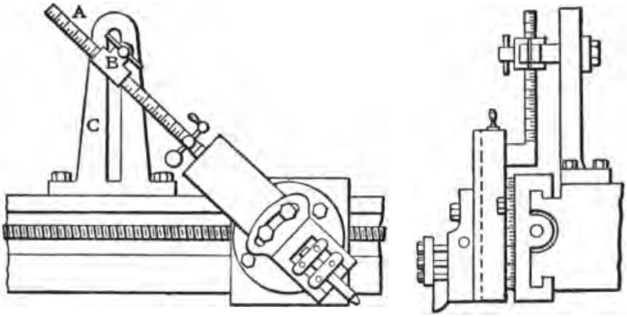


FIG. 24. ATTACHMENT FOR CIRCULAR PLANING.

Fig. 24 shows another circular planing attachment for doing the same work, only in larger radii than Fig. 23. The graduated arm *A* is fastened securely to the slide. It is locked fast at clamp *B*. This clamp *B* is bolted fast in slot of the fixture *C*.

B, while held in one position, allows *A* to swivel. It is understood that the lead screw of the slide is removed while using this fixture. Thus the feed can be used, and a nice smooth circle is the result. Referring to Fig. 25, we see another way of planing an arc. The arc *A* was fastened to *B*, which in turn was fitted to a radius bar *C*, somewhat longer than the radius of the arc to be planed. An angle plate *D* was fastened to the planer housing below the cross-slide, and supported the fulcrum pin *E* of the radius bar. A slot *F* was milled on the lower side of the radius bar to receive a stud *G*, which was fastened to the planer table. Two clamps, *H* and *I*, were put on the planer table to give the swinging arm some friction, and a hole was drilled at *J* to give clearance for the tool.

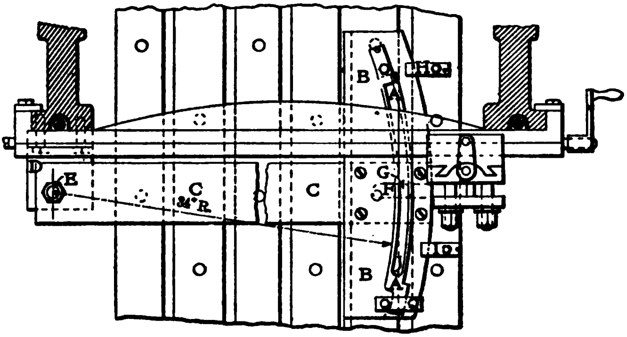
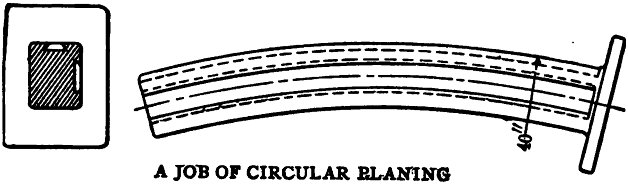


FIG. 25. ARC PLANING RIG.

Any arc of considerable radius may be planed in this way, providing a solid support for the fulcrum pin can be found in right relation to the travel of the platen.

A large radius job was machined by the use of two machines in the following manner: A steel segment, in Fig. 26, having two dovetails, was to be finished all over. A special rig had to be devised, as the radius was much too large to be turned in the ordinary way on any machine in the shop. The large rectangular head also was an obstacle in the way of turning. The sketch shows how the job was rigged up. The



A JOB OF CIRCULAR PLANING

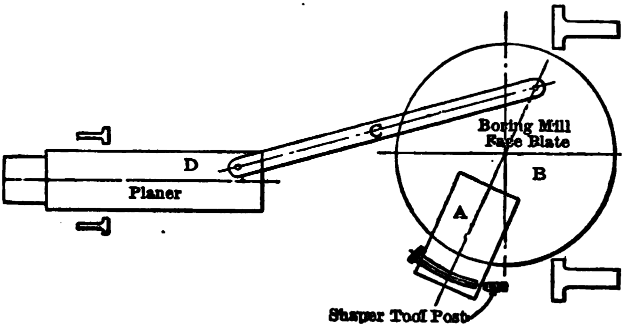


FIG. 26. ARC PLANING RIG.

segment, having an outside radius of 40 inches, was clamped to an overhanging plate *A*, which was bolted to the table *B* of a 60-inch Bullard boring mill. The mill table was connected by a strap from link *C* to the platen *D* of a nearby Gray planer, so that the reciprocating motion of the planer platen was converted into an oscillating motion of the boring table. The planer, being Sellers geared, was set to give the segment the exact amount of movement required for the cut. A glance at the drawing of the segment shows that all cuts stopped at or near the square head of the segment. The planer behaved beautifully, stopping and reversing the segment accurately as the tool reached the square head.

A Pratt & Whitney shaper head, blocked out on an angle iron from the boring-mill head to the required radius, completes the job.

A SLOTTING JOB ON THE PLANER.

A concern that built rotary planers had some tool slots to be cut in the cutter heads, and they had no machine that would take in the work. To do the work on the slotter would have been inconvenient on account of the tool slots being at an angle of 60 degrees with the face.

They fastened the cutter head to the spindle and placed the spindle in the lower half of its bearing, after which it was placed on heavy timbers, built at a height that would allow the cutter head to clear the floor, so that they could turn the head as required for the different slots. On the planer they placed a square table of a radial drill, and on that bolted the largest angle plate they had, with a pair of 3-inch parallels underneath to bring it to a proper height.

On the angle plate they bolted the cross-rail of the planer.

That giving them a cross-feed and down-feed, they could machine the slots without any trouble. Fig. 27 shows how this job is arranged.

The "rail" of a planer is often removed from the housings and clamped on the platen to accomodate awkward jobs that cannot be machined on the planer itself. An example

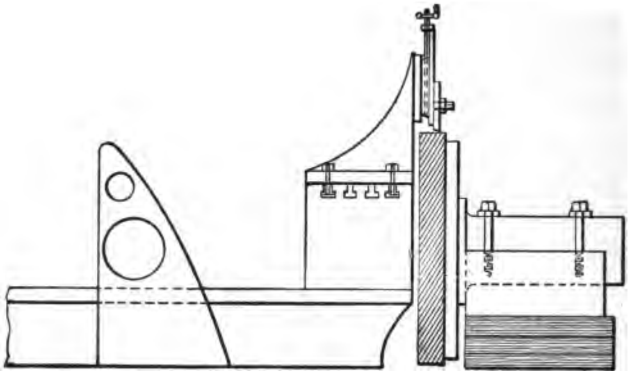


FIG. 27. A SLOTTING JOB ON THE PLANER.

would be the base of a large machine that had to be planed on the bottom. A hole is cut in the floor at one end of the planer, and the machine to be planed is turned bottom side up therein. It is then securely anchored in place, and the platen, with the "rail" clamped on it, does the work.

A TOOL-BLOCK PLANING FIXTURE.

An unsatisfactory job of planing without a special fixture is shown at *A*, Fig. 28. On account of the big lug *L* being 3 inches high, the job had to be set on blocks, as in illustration at *A*. The top side and the two sides were then finished. The clamps were then placed as at *B* before the first clamps were removed, in order that the job might not move. The angles were fitted next, and there was always danger of the job shifting. The above method of course was very slow, as only one block was done at a time. This method was used only on the first lot

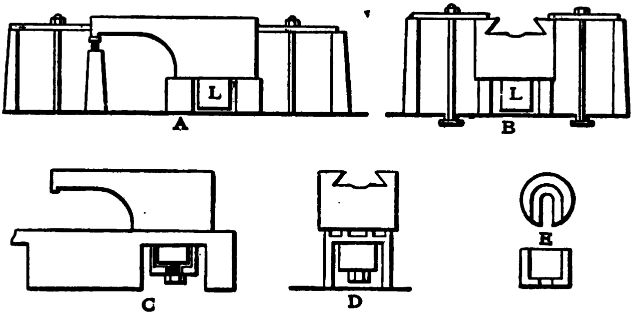


FIG. 28. TOOL BLOCK PLANING FIXTURE.

of machines turned out, then the fixture shown at *C* and *D* was made. Though very simple and cheap, the great saving of time effected over the old way will be apparent to anyone familiar with planer work. The fixture has holes bored in it properly spaced to fit the lugs of the tool-blocks. The lug and face of the block are first finished in a lathe, the hole for the screw being also tapped out. A screw is run into the tapped hole, the lug is dropped into the hole in the fixture, and the open collar *E* is slipped over the screw; then the block is lined sideways and the screw is tightened up and holds any cut put on. The fixture is made in two sections to make handling it easy, and each section holds three tool-blocks. The top has four ribs on it to save planing and make the appliance lighter. The fixture allows the job to be finished at one setting.

CUTTING SPIRAL GROOVES ON THE PLANER.

Some time you might have some spiral grooves to cut, and you might adopt this fixture to suit your job. The rolls to be cut in this particular job were 6 inches in diameter, 160 teeth, and to turn 20 teeth in their length. The roll was mounted on heavy V-blocks. On the end of the journal was put a three-jawed universal chuck; in the recess for the chuck plate was bolted a ratchet plate having 160 teeth. A lever attached to this plate, shown in Fig. 29, ran on an inclined

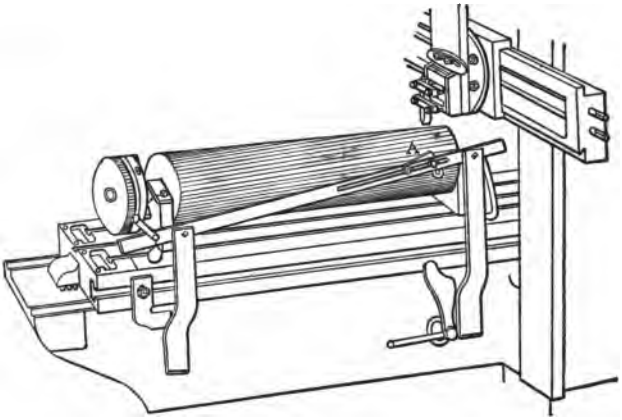


FIG. 29. RIG FOR PLANING SPIRAL GROOVES.

bar which was fastened stationary to vertical arms bolted to the planer bed. This lever as it came down the incline would run the ratchet over 20 teeth and start a fresh tooth. For 8 teeth it would run itself, but then it began over again and had to be set ahead a tooth, when it would cut 8 more. By putting on a little extra incline at *A*, and running the planer at a trifle longer stroke, the ratchet would turn the roll a total of say 21 or 23 teeth, while it still turned only 20 teeth during the cut. By setting it to cut any number which did not have a common divisor with the number of teeth to be cut, it will cut all the teeth without attention. The addition of a flap of leather wired to the back of the tool to lift it off the work (if you have a rope lift, as before described, you will not need the leather) on the return stroke, makes a complete outfit for the job required. Of course this job is, as you have noted, not a true spiral or helix, but as it was for some kind of a flour or feed mill it doubtless filled all requirements. The author has often cut grooved rolls (not spiral, however, but rolls with similar shaped teeth for rolling washboard fronts) by placing on the platen a plain index head of the Cincinnati miller, together with the tail-stock, and by holding the roll between the centers, the whole number of teeth were cut without once stopping the planer. The indexing was done on the return stroke.

PLANING A LARGE CYLINDER ON A PLANER.

The engravings, Figs. 30 and 31, will show without much explanation how the valve seats on a cylinder 28 inches in diameter and 14 feet long were planed. The planer, you will see, was very much too small. The cylinder had wings or feet on each side. One side only was supported on the planer platen. The farther side frame of the planer was removed, a longer cross-rail was provided at the top, and the outer end of it was firmly supported. A timber was placed parallel with the planer ways with strips of boiler plate on its upper side. Another timber to travel on this had boiler plate on its under side, with rollers made of old boiler tubes between the two timbers. The outer feet of the cylinder were bolted to the upper timber. The man running the planer shipped the platen at the end of the stroke by hand.

Fig. 32 shows a planer with the platen extended to accommodate an awkward job that was too long for the platen.

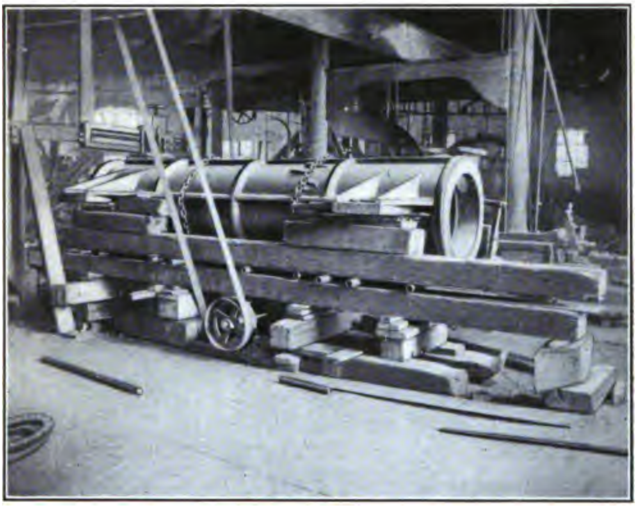


FIG. 30. PLANING A LARGE CYLINDER ON A SMALL PLANER.

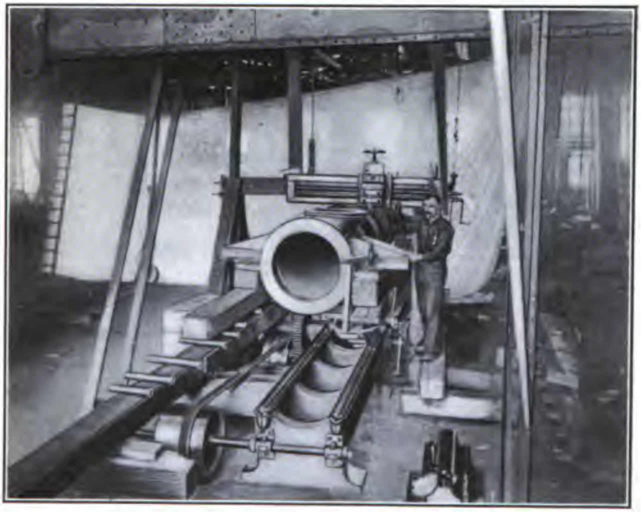


FIG. 31. PLANING A LARGE CYLINDER ON A SMALL PLANER.

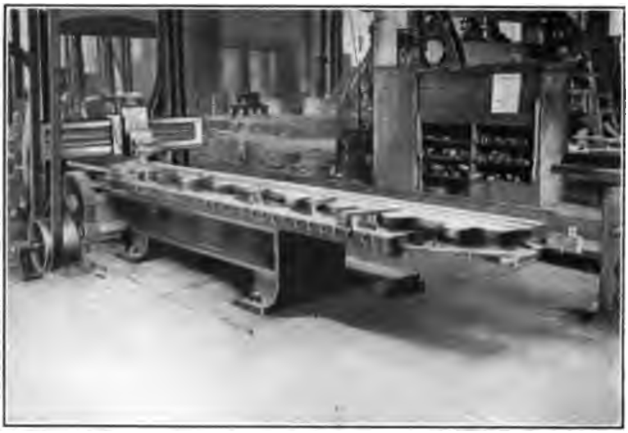


FIG. 32. A RACK EXTENSION FOR PLANER PLATEN.

LOOKING BACKWARD.

In reviewing this book, the author finds he has not told it all, because he has had occasion to find out more than once that he does not know it all, and that we are all apprentices in every walk of life, and while we may be called "journeymen," we have still something more to learn.

PLANER-GRAMS.

Don't worry.

Don't leave your planer and wander around the shop.

Don't be afraid to accept another suggestion.

Don't know it all.

Don't forget to ask for a raise—but—

Don't do it unless you're worth it.

Don't think the shop will shut down if you quit.

A FOREMAN'S ADVICE TO THE PLANER HAND.

"That piece of work is all right—only it's spoilt. Make a new piece. When I say tight, I mean loose, but no shake."

THAT'S ALL.